

Printed Pages : 7



EAS-102

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 9603**

Roll No.

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## B. Tech.

(Only for the candidates admitted/Readmitted in the session 2008-09)

**(SEM. I) EXAMINATION, 2008-09**

**ENGG. CHEMISTRY - I**

*Time : 3 Hours]*

*[Total Marks : 100*

## SECTION - A

1 Choose / Fill correct answer : **20×1=20**

(i) The bond energy of  $N_2$  is \_\_\_\_\_ than that of  $O_2$ .

(ii) Which of the following possesses lowest energy ?

(i) NO (ii)  $O_2$  (iii)  $N_2$  (iv) CO

(iii) Which of the following results in strongest bonding ?

(i) Electrovalent (ii) Co-ordinate

(iii) Covalent (iv) H-bond.

(iv) Which of the following molecules possesses the smallest bond length ?

(i)  $F_2$  (ii)  $Cl_2$

(iii)  $Br_2$  (iv)  $I_2$

(v) Rate of reaction is directly proportional to the \_\_\_\_\_.

(vi) The reaction :  $N_2O_5(g) \rightarrow N_2O_4(g) + \frac{1}{2}O_2(g)$  is :

(i) Zero order (ii) First order

(iii) Second order (iv) Fractional order.





- (vii) Threshold energy = Activation energy + \_\_\_\_\_.
- (viii) Bragg's equation is \_\_\_\_\_.
- (ix) Chlorination of benzene is carried out in the presence of
- (i)  $AgNO_3$       (ii)  $TiCl_4$
- (iii)  $FeCl_3$       (iv)  $NiCl_2$
- (x) Ketoxime  $\xrightarrow{H_2SO_4}$  N-substituted amide. This reaction is known as
- (i) Aldol condensation
- (ii) Beckmann rearrangement
- (iii) Hoffmann rearrangement
- (iv) Diels - Alder reaction.
- (xi) Cyclohexanone oxime  $\xrightarrow{H_2SO_4}$  \_\_\_\_\_.
- (xii) Which of the following compounds shows optical isomerism ?
- (i)  $CH_3 - CH(OH) - COOH$
- (ii)  $CH_3 - CHBr - CH_3$
- (iii)  $CH_3 - CH(CH_3) - CH_2CH_3$
- (iv)  $CH_3 - CH(OH) - CH_3$ .
- (xiii) The degree of polymerization represents the \_\_\_\_\_.
- (xiv) The polymerization which is accompanied by elimination of small molecules is called :
- (i) Addition
- (ii) Copolymerization
- (iii) Condensation
- (iv) Crosslinking polymerization.

- (xv) Polystyrene is prepared from styrene in presence of \_\_\_\_\_.
- (xvi)  $[Pt Cl_3 (C_2H_4)]^- K^+$  is known as \_\_\_\_\_.
- (xvii) In neutralization titration of  $Na_2CO_3$  Vs  $HCl$ , the indicator used is :
- (i) Methyl yellow
- (ii) Methyl red
- (iii) Methyl orange
- (iv) Erio-Chrome black T
- (xviii) The absorbance is directly proportional to :
- (i) Wavelength
- (ii) Path length
- (iii) Concentration
- (iv) Concentration and path length both.
- (xix) IR active molecules are those which undergo a net change in \_\_\_\_\_.
- (xx) Number of NMR signals obtained in  $CH_3COCH_3$  will be
- (i) 2
- (ii) 6
- (iii) 1
- (iv) 3.

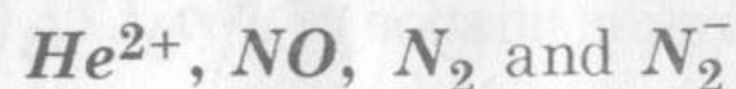




## SECTION - B

2 Attempt any **three** of the following : 10×3=30

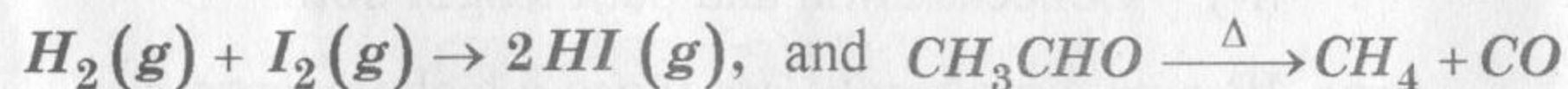
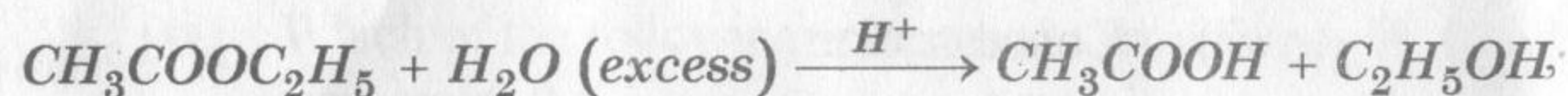
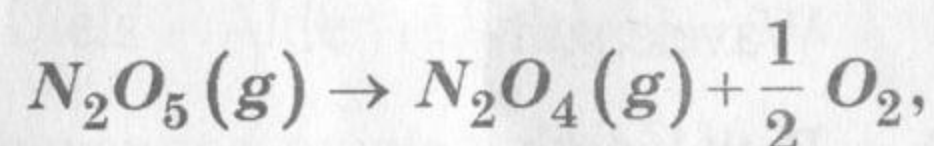
- (i) (a) What is molecular orbital theory ? With the help of molecular orbital diagram, calculate the bond order of the following :



- (b) An edge of cubic cell of NaCl crystal is  $6.5 \times 10^{-8}$  cm. Assuming that four molecules of NaCl are associated per unit cell, calculate its density.

Given : Avogadro's number =  $6.023 \times 10^{23}$ .

- (ii) (a) Distinguish between order and molecularity of a reaction, calculate order and molecularity of the following reactions :



- (b) What is activation energy ? Discuss its relationship with rate constant of a reaction.
- (iii) What are the properties of a good fuel ? Define, High and Low Calorific Values. A 0.80 g sample of a solid fuel was completely combusted in the excess of oxygen using bomb calorimeter. The rise in temperature of water in calorimeter was  $2.5^\circ C$ . Calculate the High Calorific Value of the fuel, if water taken in calorimeter is 2000 g and water equivalent of calorimeter is 2200 g. Also calculate Low Calorific Value.

(Given : % H in fuel = 2.2).

(iv) Give the mechanism of the following reactions :

- (a) Beckmann rearrangement  
(b) Diels-Alder reaction.

- (v) Distinguish between homopolymers and copolymers. Why do polymers have an average molecular weight ?

## SECTION - C

10×5=50

3 Attempt any **one** part of the following :

- (a) What do you understand by liquid crystalline state ? Discuss the classification of liquid crystals and write their applications.  
(b) Discuss properties and applications of fullerene.

4 Attempt any **one** part of the following :

- (a) What do you mean by EMF ? Discuss chemical and concentration cells.  
(b) Derive an equation for half life period of a first order reaction.

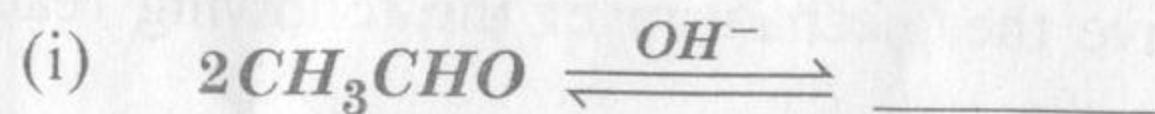
A compound decomposes according to the first order rate law with a half life period of 30 min. Calculate the fraction of remaining compound after 120 min.

5 Attempt any **one** part of the following :

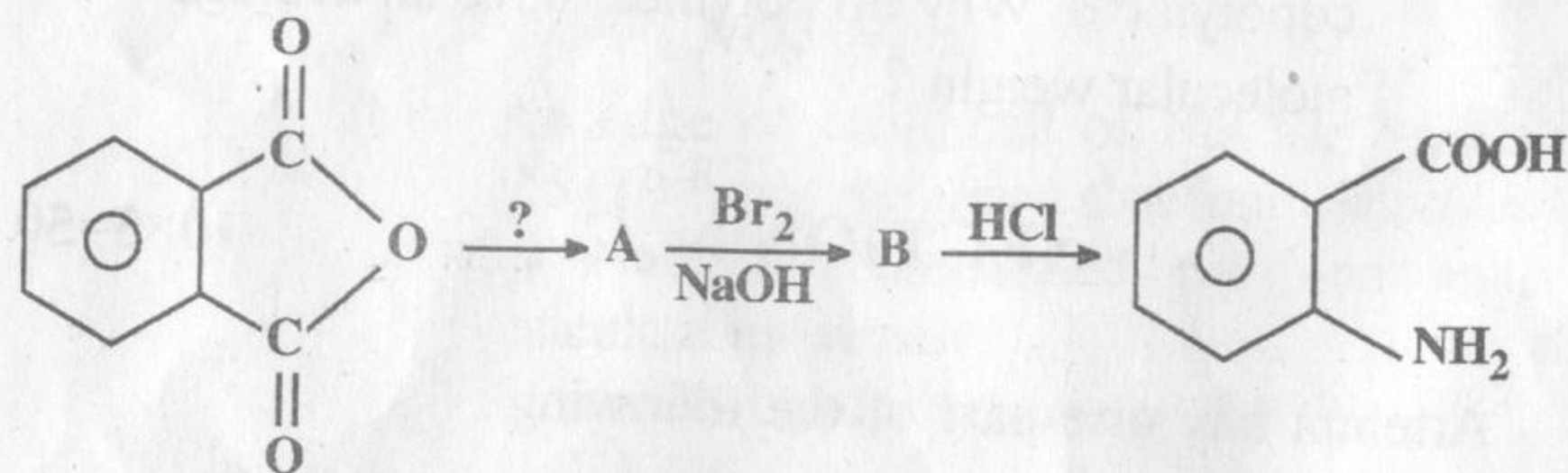
- (a) Complete the following reactions and write their mechanism :



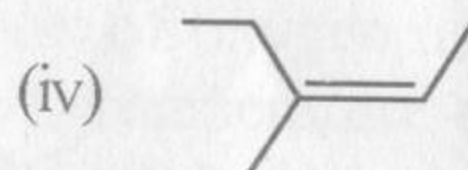
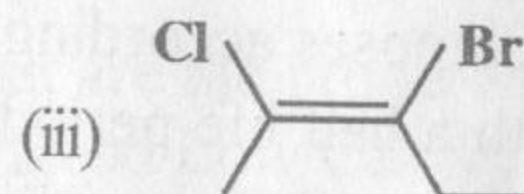
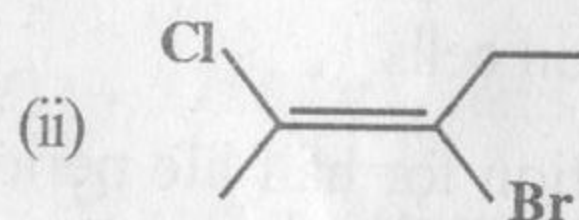
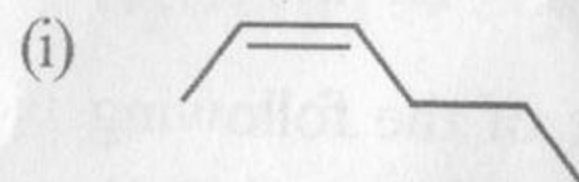




(iii)



- (b) (i) What do you understand by E-Z notations ? Assign E and Z configuration to the following compounds :

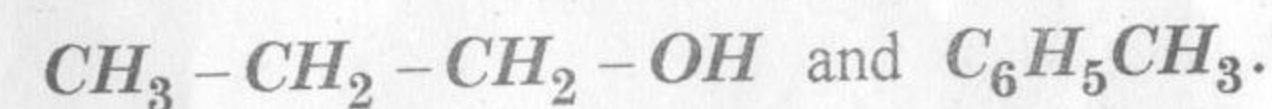


- (ii) Discuss the conformations of n-butane with the help of its potential energy diagram.

6 Attempt any **one** part of the following :

- (a) (i) An organic compound having molecular formula  $\text{C}_7\text{H}_6\text{O}$  shows absorption peaks at 3010, 2700, 1600, 1580, 1520, 1480 and  $1720\text{ cm}^{-1}$  in its IR spectrum. Suggest its structure.

- (ii) Define chemical shift. Show the expected NMR signals and their splitting in the following compounds :



OR

- (a) What is Beer-Lambert law in UV-VIS absorption spectroscopy ? A compound having concentration  $10^{-3}\text{ g/l}$  resulted absorbance value **0.20** at  $\lambda_{\text{max}}$  **510 nm** using **1.0 cm** cell. Calculate its absorptivity and molar absorptivity values. Molecular weight of compound is 400.
- (b) Discuss the ion exchange method for water softening. Compare its merits with Zeolite method.

7 Attempt any **one** part of the following :

- (a) Discuss the thermoplastic resins. Write the synthesis and applications of polystyrene and polyvinyl chloride.
- (b) What are the organometallic compounds ? Give the preparation and properties of organometallic compounds of lithium.

